

REMARKS

This is in response to the currently outstanding Official Action in the above-identified application.

Claims 1- 9 were pending in this application at the time of the issuance of the currently outstanding Official Action. By the foregoing Amendment, Applicants have amended Claims 1 - 5 and 7 - 9. Claim 6 has been canceled, without prejudice. Further, new Claims 10-17 have been added. No claims have been withdrawn. Accordingly, upon the entry to the foregoing Amendment, Claims 1-5 and 7-17 as hereinabove amended will constitute the claims under active prosecution in this application.

The claims of this application are reproduced above including appropriate status identifiers and showing the changes made as required by the Rules.

More particularly, in the currently outstanding Official Action the Examiner has:

1. Acknowledged Applicants' claim for foreign priority under 35 USC §119 (a)-(d) or (f), and confirmed the receipt of the required copies of the priority documents by the United States Patent and Trademark Office;
2. Indicated that the drawings filed as part of this application on 8 July 2005 are accepted;
3. Indicated that the Information Disclosure Statements filed with this application have been duly considered by providing us with a copies of the Forms PTO/SB/08a/b that accompanied those Statements duly signed, dated and initialed by the Examiner in confirmation of his consideration of the art therein disclosed.

4. Rejected claims 1-9 under 35 USC §102(e) as being anticipated by Komoda

(US 6,249,080 B1);

5. Indicated that the following patents are deemed to be pertinent to Applicants' disclosure,

but failed to apply any of them against the pending claims of this application:

Honda et al. (US Patent No. 6,765,342 B1) as disclosing a field emission device;

Komoda et al. (US Patent No. 6,720,717 B2) as disclosing a field emission device;

Kitamura et al. (US Patent No. 6,624,589 B2) as disclosing an electron emitting device;

Watabe et al. (US Patent No. 6,498,426 B1) as disclosing a field emission electron source; and

Hatai et al. (US Patent No. 6,285,118 B1) as disclosing discloses a field emission device.

No further comment regarding items 1-3 and 5 above is deemed to be required in these Remarks.

With respect to item 5, Applicants respectfully note that the Examiner has taken the position that the claims of the present application are anticipated by the Komoda reference. Specifically, the Examiner alleges with respect to Claim 1 that:

With respect to claim 1, Komoda discloses, in Fig. 3, an electron emission device comprising (1) an electron emitter that includes a lower electrode (2), and upper electrode (7) made of thin film (see col. 6, lines 52-53) and a semiconductor layer (1, 5, 6) formed between the lower electrode (2) and the upper electrode (7), a surface of the upper electrode (7) exposed to an external space 9 between (7) and (21) as shown in Fig. 3); (2) a counter electrode (21) that is provided opposite the upper electrode (7) across the external space; (3) fine particle charging voltage control section (V_{PS}) that applies an electrode emitting voltage for accelerating electrons in the semiconductor layer (1, 5, 6), passing the electrons through the upper electrode (7), and emitting the electrons to the external space, or a voltage for charging fine particles attached to the surface of the upper electrode between the upper electrode (7) and the lower electrode (2); and (4) a flying voltage control section (V_C) that applies between the upper electrode (7) and the counter electrode (21), a voltage for allowing the charged fine particles to fly from the surface of the upper electrode (7) to the counter electrode (21), whereby inherently providing the electron emission device with a cleaning function (since it is used with a solid vacuum device (see col. 2, line 48)

Applicants do not disagree that the Komoda reference discloses an electron emitter somewhat similar to the electron emitter herein claimed with respect to the creation of an electron emission current I_e between the upper electrode and the counter electrode utilizing electrons accelerated in the electron emitter that pass through the upper electrode. However, Applicants strenuously disagree with the Examiner's summary conclusion (apparently derived by some sort of undefined inherency argument) that the Komoda reference anticipates the present claims of this application, particularly as clarified hereinabove.

More specifically, while as the Examiner correctly asserted the Komoda reference appears to disclose "a fine particle charging voltage section [V_{PS}] that applies an electron emitting voltage for accelerating electrons in the semiconductor layer [1, 5, 6], passing electrons through the upper electrode [7], and emitting electrons to the external space", Applicants can find no teaching, disclosure or suggestion within the Komoda reference to the effect that [V_{PS}] applies (or is in any way capable of applying) a voltage for charging fine particles attached to (adhered to) the surface of the upper electrode between the upper electrode [7] and the lower electrode [2].

Further, Applicants can find no teaching, disclosure or suggestion in the Komoda reference to the effect that the “fine particle charging voltage section [V_{PS}]” of the Komoda reference at any time applies a voltage of a reverse polarity to the voltage tending to cause emitted electrons to move toward the counter electrode 21 or no voltage during the course of the operation of the apparatus therein disclosed. In this regard, Applicants specifically call attention to the Komoda reference at Column 8, lines 23-24 wherein it is indicated that electron emission current I_e was observed only when the DC voltage V_{PS} was positive. and further to Komoda at Column 12, lines 47-52, whereat it appears to clearly indicated that the teaching of Komoda invention involves a new semiconductor material for disposition between the upper and lower electrodes that allows the electron emission current I_e and the diode electric current I_{PS} to be maintained substantially constant with time (i.e., without the so-called “popping” within the semiconductor crystal materials previously used that disrupted steady electron emission current). Indeed, it is the latter feature of the Komoda reference that is alleged therein (i.e., stable electron current with less chronic change than was achievable utilizing the prior art) to have been Komoda’s contribution to the art.

Accordingly, Applicants respectfully submit that at best the Komoda reference teaches, discloses and/or suggests only the capability of the electron emitter therein disclosed to operate so as to emit electrons and convey the same toward the counter electrode in a steady manner. In other words, Komoda teaches, discloses and/or suggests only “a field emission electron source capable of achieving a stable emission of electrons with high efficiency without undesirable electrical discharge between the upper electrode and the counter electrode useful in a device for uniform light emission.” (See, Komoda at Column 2, lines 40-50).

In the above regard as well, the Examiner’s attention is respectfully drawn to the discussion at pages 28-34 of the present application. At that point in the description of the present invention, it is made clear that the normal operation of an electron emission device as described by the Komoda reference will not inherently clean fine particles from the surface of the upper electrode because the electric field required to do so (i.e., to overcome the image force F_i and the van der Waals’ force F_v) the electrostatic force F_e may well have to exceed the atmospheric discharge phenomena inherent to the system.

Hence, while it is true that the Komada reference may be characterized as disclosing the operation of an electron emission device in an environment wherein fine dust and paper particles may be expected to be present, it clearly is not true that the Komoda reference in any manner recognizes, much less deals with, the problems of reduced electron emission current caused by the accumulation of fine particles adhered to the surface of the upper electrode of the emitter. Nevertheless, the Examiner insists that the Komoda reference discloses a “flying voltage control section [V_C]” that applies between the upper electrode and the counter electrode a voltage for allowing the charged fine particles to fly from the surface of the upper electrode toward the counter electrode as an inherent result of the fact that the Komoda device is used with solid state vacuum devices and the like – namely planar light emitting devices that would inherently include laser printers and digital copying machines wherein fine particles of dust, toner or paper would be expected to collect on the upper electrode.

Applicants respectfully submit that while the Examiner’s position is at first may appear appealing, it cannot withstand serious analysis. For the reasons discussed in detail in the present specification, the operation of the electron emission apparatus of the Komoda reference (and indeed those akin thereto in the art) is inhibited when fine particles are attached to (adhered to) the upper surface of the upper electrode because the electrons that would otherwise form part of the emission current flow are inhibited (or prevented) from passing through the upper electrode into the external space by the fine particles adhered to the upper surface of the upper electrode.

A review of the present disclosure and claims has revealed to Applicants that the use of the terminology “fine particle charging voltage control section” and “flying voltage control section” in the specification and claims of the present application to refer to voltage controllers that have the capability of causing the electron emission apparatus to function in the manner disclosed in the Komoda reference and in a manner adapted for cleaning fine particles adhered to the upper surface of the upper electrode from the electron emission device so as to allow it to operate in a steady state mode as contemplated by Komoda may have contributed to the Examiner’s attribution of characteristics to the Komoda voltage controllers that they are not disclosed by Komoda to have and do not inherently have.

In other words, the Examiner's reliance upon the principle that a recitation in a claim with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art *if the prior art teaches the structural limitations of the claim* is respectfully submitted to be misplaced in the present circumstances. This is respectfully submitted to be the case because the Komoda voltage controllers are nowhere disclosed, taught or suggested to have all of the operational capabilities of the voltage controllers of the present invention, i.e., the structure of the Komoda voltage controllers that allows them to operate the electron emission apparatus in a manner resulting in a steady state electron emission current *is not the same as, and cannot justifiably be asserted to inherently include, structure that would allow those voltage controllers to have the capability of functioning in the manner herein claimed.* Hence, the "fine particle charging voltage control section" of the present invention has the capability of functioning in the same manner as the voltage controller V_{PS} disclosed in the Komoda patent *and also has the capability of functioning in the manners claimed during the cleaning of fine particles adhered to the upper surface of the upper electrode.* A similar situation exists with respect to the "flying voltage control section".

Accordingly, in order to remove the potential confusion arising from the original terminology utilized for identifying the voltage controllers of the present invention and distinguishing them from the prior art, Applicants by the foregoing Amendment have altered the terminology utilized in the present claims so as to more correctly refer to the voltage controller controlling the voltage between the upper and lower electrodes as the *"first voltage control means"* and the voltage controller that controls the voltage between the upper electrode and the counter electrode and the *"second voltage control means"* that by definition have the capabilities of the corresponding structure disclosed in the specification which as already noted includes the capability of the Komoda voltage controllers as well as significantly different capabilities thereby clearly differentiating the structure of the Komoda voltage controllers from the structure of the voltage control means of the present invention. Accordingly, Applicants respectfully submit that to whatever minor extent the operation of the Komoda device might result in the removal of fine particles from the surface of the upper electrode, the claims of the present application now are abundantly clear to the affect that the cleaning function built into the electron emission apparatus of the present invention is distinct from its electron emission function and that the voltage controllers of the Komoda reference are not in any way inherently capable of causing that device to operate in a cleaning mode as is made possible by the voltage control means of the present invention.

Therefore, reconsideration and allowance of Claims 1-5 and 7-9 as hereinabove amended in response to this communication is respectfully requested (Claim 6 has been cancelled, without prejudice, as being essentially redundant).

In addition, Applicants by the foregoing Amendment are presenting new Claims 10 – 17 that are directed to the methods of cleaning fine particles from an electron emission device that are set forth throughout the present specification (see in particular page 17, first full paragraph). Applicants respectfully submit that the submission of these claims at this point in the present prosecution is appropriate because the added claims are particularly and distinctly addressed to the manner of using the claimed apparatus which itself is distinct from the art relied upon by the Examiner in the currently outstanding Official Action.

Further, as pointed out above, even in the event that the Examiner maintains his position that the present claims simply cover a way of using the same structure as disclosed by the Komoda reference and are not patentable as apparatus claims (a position with which Applicants strenuously disagree for the reasons set forth above), Applicants respectfully submit that the latter position in itself may be taken as a holding by the Examiner that the present invention at least in part is directed to a method of using the device claimed. Accordingly, in such an event, Applicants respectfully submit that they are entitled to place the claims of this application in specific method claim form without any imputation by the Examiner that they have somehow elected the apparatus over the method of its operation. Applicants respectfully submit that such a holding would be inconsistent with the Examiner's currently outstanding rejections that attempt to take Applicants to task for arguing method of use factors in support of apparatus claims.

For each and all of the foregoing reasons, entry of the foregoing Amendment, reconsideration and allowance of all of the claims then present in this application (namely Claims 1-5 and 6-17 as hereinabove amended) in response to this communication are respectfully requested.

Applicant also believes that additional fees beyond those submitted herewith are not required in connection with the consideration of this response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. 04-1105, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

Date: March 23, 2007

David A. Tucker
SIGNATURE OF PRACTITIONER

Reg. No.: 27,840

David A. Tucker
(type or print name of practitioner)
Attorney for Applicant(s)

Tel. No. (617) 517-5508

Edwards & Angell, LLP
P.O. Box 55874
P.O. Address

Customer No.: 21874

Boston, MA 02205